The limits of those genera, it may not be unnecessary to remark, were intended to include the same species referred to Bleeker's genera, founded on the same types. XIRICHTHYS embracing *X. novacula*, Cuv., *X. argentimaculata* Steind., (*Nov.*) *Javanica* Blkr., *X. cyanifrons* C. V., *X. martinicensis* C. V., *X. uniocellata* C. V., *X. lineata* C. V. and *X. mundiceps* Gill. INIISTIUS includes only the *I. pavo*, *I.* (*Nov.*) *tetrazona* ex Blkr., *I. mundicorpus* Gill, *I.* (*Xir.*) *dea* ex T. S. and *I.* (*Nov.*) *aneitensis* ex Gthr. To NOVACULA are referrible the *N. pentadactyla*, *N. punctulata*, *N. Twistii*, *N. melanopus* and *N. spilonotus*, and probably *N. bimaculata* ex Rüpp. The genus *Iniistius* would not include the *Novaculichthys callosoma* of Bleeker, but at the same time I would not have included it in *Novaculichthys* as it differs not only in the notch between its two produced anterior rays and the third, but also in the still more anterior insertion of the ventral fins; it may be called *Dimalacocentrus callosoma*.

Genus XYRICHTHYS Cuvier, 1815.

Novacula *Bleeker*, 1862, (nec *C. V.*) *Cuv.* R. A. ii. p. 265, 1817.

The genus "*Xyrichthys*" was especially established upon the *Coryphæna novacula* of Linnæus, by Cuvier, in his Memoir on the Fishes of the Mediterranean.* The name must consequently be retained for the genus of which that is the type.

XYRICHTHYS MUNDICEPS Gill.

Xirichthys mundiceps *Gill*, Proc. Acad. Nat. Sci. Phila., 1862, p. 143.
Novacula mundiceps *Günther*, Cat. iv. p. 172.
Hab.—Cape St. Lucas.

Genus INIISTIUS Gill.

Xirichthys *Bleeker* (nec Cuv. 1815.)

The genus was first recognized by Dr. Bleeker, as now limited, slightly before it was named by the present author, but that gentleman has given to it a name which was originally applied to an allied genus for which it should apparently be retained.

INIISTIUS MUNDICORPUS Gill.

Iniistius mundicorpus *Gill*, Proc. Acad. Nat. Sci. Phila., 1862, p. 145.
Novacula mundicorpus *Gthr.*, Cat. iv. p. 176.
Hab.—Cape St. Lucas.

Synopsis of the family of LEPTUROIDS, and Description of a remarkable new generic type.

BY THEODORE GILL.

My valued correspondent, M. Felipe Poey, of the University of Havana, in a recent transmission of specimens of natural history to the Smithsonian Institution, forwarded a most interesting fish belonging to the family of Lepturoids, and evidently most closely related to the genus *Lepidopus*. That gentleman, in a previous letter, had drawn my attention to it, and desired me to describe it. This request, so much in accordance with my own inclinations, is now responded to, and, at the same time, in order to illustrate its affinities and differential characters, the diagnoses of the previously known genera of *Lepturinæ* and *Lepidopodinæ* are submitted.

Family *LEPTUROIDÆ* Gill.

Synonymy.

Trichiurini *Rafinesque*, Indice d'Ittiologia Siciliana, p. 37, 1810.

* Memoires du Mus. d'Hist. Nat., i. pp. 324, 329, 1815.

Teniosomes *Blainville*, Journal de Physique, t. lxxxiii. p. 25, 1816.
Trichiuridæ *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 342.
Lepturoidæ *Gill*, Catalogue of the Fishes of the Eastern Coast of North America, &c., p. 35.
Peropteres pt. *Dum.*

Elongated riband-shaped fishes, with the tail very slender, either filiform and finless, or with a forked caudal; a naked skin; maxillars not protractile, more or less coalescent and hiding mostly under the suborbital bones, the post-anal region with numerous, almost concealed spines, and the ventral fins obsolete or represented by scale-like spines behind the pectoral region.

The Lepturinæ and Lepidopodinæ have the most anterior spines simple, but becoming gradually grooved on their posterior edges, and soon the spines themselves are split to their bases.

The following genera belong to this family:

Conspectus

I. Dorsal fin undivided.
  A. Tail filiform and finless ..... LEPTURINÆ.
    α. Lateral line near the abdomen ..... Lepturus.
    β. Lateral line median ..... Eupleurogrammus.
  B. Tail with a normally developed and forked fin ..... LEPIDOPODINÆ.
    α. Profile rectilinear and forehead depressed ..... Lepidopus.
    β. Profile high, trenchant and boldly declining ..... Evoxymetopon.
II. Dorsal fin double ..... APHANOPODINÆ.
  Teeth of the palate wanting ..... Aphanopus.

Aphanopus Lowe is only known to me through the descriptions of Lowe and Günther, which leave considerable to be desired. I am, therefore, precluded from giving a detailed diagnosis. It is to be hoped that some of the Madeiran ichthyologists will more fully illustrate that singular type.

Subfamily *LEPTURINÆ* Gill.

Synonymy.

Trichiuria *Rafinesque*, Analyse de la Nature, &c., 1815.
Trichiurini *Bonaparte*, Systema Vertebratorum, 1831.
Trichiurinæ *Swainson*, Natural History of Fishes, Amphibians and Reptiles, vol. ii. p. 254, 1839.
Lepturinæ *Gill*, Catalogue of the Fishes of the Eastern Coast of North America, p. 35, 1860.

Genus LEPTURUS Artedi.

Synonymy.

Lepturus *Artedi*, Descriptiones Specierum Piscium, p. 111, 1738.
Enchelyopus *Klein*, Historiæ Piscium Naturalis promovendæ Missus quartus, p. 51, 1744.
Gymnogaster *Gronovius*, Museum Ichthyologicum, i. p. 17, 1754.
Trichiurus *Linnæus*, Systema Naturæ, ed. 10, vol. i. p. 429.
Trichiurus *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 346, 1860.
Enchelyopus *Bleeker*.

Body naked, very long and thin, rather rapidly decreasing in its posterior half and terminating in the slender, compressed, finless caudal filament.

Lateral line simple, strongly decurved behind the pectoral fin and continued near the line of the abdomen to its extremity.

Head much compressed, oblong, conic, with the profile straight or incurved and the snout terminating acutely and more or less gibbous near its end. Forehead with an elongated linear depression, bounded on each side by a

ridge of the frontal bone. Eyes moderate, nearly in the middle of the head. Operculum oblong, striated and fringed behind, extending above the bases of the pectoral fins. Nostrils vertical, in front of eyes.

Mouth rather large, the supramaxillars extending partially under the eyes; intermaxillars and supramaxillars united; supramaxillars convex above at the middle, behind with a projection downwards truncated in front. Lower jaw narrow and produced at its chin.

Teeth, one or two on each side of the intermaxillars elongated and barbed; behind smaller, compressed and triangular; smaller in the lower jaw and minute on the palatine bones.

Dorsal fin continuous from the nape and nearly above the preoperculum to the filamentous tail, nearly uniform or higher towards the middle. Anal spines very minute.

Ventral fins entirely absent.

D. CXII.—CXL.

Vertebræ 39 | 112 pm.

Cæca pylorica 24 pm.

This genus is represented in all the tropical seas, except perhaps the African ones, and some of its members wander into the temperate ones, species occuring along the Eastern American coast, as well as the Japanese and Chinese seas. The following five species are well determined:

1. LEPTURUS ARGENTEUS = Trichiurus lepturus *C.* et *V.* viii. p. 237.
   Western Atlantic.
2. LEPTURUS JAPONICUS = Trichiurus japonicus *Blkr.*
   Japan.
3. LEPTURUS SAVALA = Trichurus savala *C.* et *V.* viii. p. 251, pl. 224.
   East Indian and Chinese seas.
4. LEPTURUS HAUMELA = Trichiurus haumela *C.* et *V.* viii. p. 249.
   East Indian seas.
5. LEPTURUS LAJOR = Trichiurus lajor *Blkr.*
   Manado.

Genus EUPLEUROGRAMMUS Gill.

Synonymy.

Eupleurogrammus *Gill*, Proc. Academy of Natural Sciences of Phila., 1862.
Trichiurus sp. *Gray*, *Günther*.

Body naked, very long and thin, rather rapidly decreasing at its posterior half and terminating in the slender, compressed, finless caudal filament.

Lateral line simple, scarcely decurved, and continued along the middle of the side to its termination.

Head much compressed, oblong conic, with the profile nearly straight, the forehead transversely convex, the snout acute and scarcely gibbous near its end. Eyes rather large, situated nearly in the middle of the head. Operculum oblong and fringed behind, extending above the base of the pectoral fins. Nostrils vertical, in front of the eyes.

Mouth as in *Lepturus*.

Teeth as in *Lepturus*.

Dorsal fin continuous from the nape nearly above the preoperculum to the extremity of the tail, where the spines are very minute. Anal spines very minute.

Pectoral fins longest at the upper rays, obliquely subtruncated below.

Ventral fins replaced by a pair of minute scale-like spines.

D. CL. pm.

Type. Eupleurogrammus muticus *Gill* ex *Gray*.

This genus differs from *Lepturus* chiefly by the course of the lateral line along the middle of the body,—the feature indicated by the generic name,—and

also by the presence of scale-like spines in place of the ventrals. It thus shows a tendency towards *Lepidopus*, and perhaps further by a more perfect development of the tail than occurs in *Lepturus*.

According to Günther, the *Trichiurus muticus* and *T. intermedius* of Gray are not specifically distinct, and, if this opinion is correct, the typical species of the genus is the only one known. Both forms inhabit the East Indian and Chinese seas.

Subfamily *LEPIDOPODINÆ* Gill.

Genus LEPIDOPUS Gouan.

Synonymy.

Lepidopus *Gouan*, Historia Piscium, p. 185, 1770.
Vandellius *Shaw*, General Zoology, vol. iv. p. 199, 1803.
Scarcina *Rafinesque*, Caratteri di alcuni Nuovi Generi, &c., della Sicilia, p. 20, 1810.
Zipotheca *Montagu*, Memoirs of the Wernerian Society, vol. i. p. 81, (1809), 1811.
Lepidopus *Cuv.*, *Günther*, et al.

Body naked, very long and thin, gradually decreasing backwards till within a short distance of its extremity, when it rapidly tapers into a slender compressed caudal peduncle, on which is set a small, but completely developed, caudal fin. Anus subcentral.

Lateral line simple, little decurved from the scapular region and continued along the middle of the side to its end.

Head much compressed, oblong, conic, with the profile nearly straight or constricted behind the forehead, and with the snout gibbous near its end; forehead narrow, with an elongated triangular depression between two frontal ridges. Eyes moderate, situated nearly in the middle of the head. Operculum oblong, not extending as far back as the bases of pectoral fins, fimbriated on its margin. Nostrils oblique, in front of the eyes.

Mouth moderate, the supramaxillars extending to about the vertical from the front of the eye; intermaxillars and supramaxillars free, the former highest near the middle and arched above, again widened towards the ends, with a terminal expansion downwards truncated in front. Lower jaw narrowed to its extremity and bluntly produced at the chin.

Teeth, two or three long, simple, (or barbed ?), compressed ones on each side of the intermaxillars in front,* and behind a row of small ones. Lower jaw with a similar row ; palatine teeth minute.

Dorsal fin commencing above or behind the preoperculum, nearly uniformly high and continuous almost to the caudal fin. Anal spines numerous and minute ; behind enlarged and connected by a membrane to form a fin.

Caudal fin small but normally developed, deeply forked, and with subacute lobes.

Pectoral fins inserted almost horizontally, with the lower rays longest, and above emarginated.

Ventral fins represented by scale-like spines inserted behind the pectoral fins.

D. C—CV. A. XX—XXV.

Vertebræ 41 | 71 pm.

Cæca pylorica 23 pm.

Type. Lepidopus caudatus *White* ex *Euphrasen.*

Only one species of this appears to be known. It has been only found in the Mediterranean Sea and the eastern parts of the Atlantic Ocean.

Genus EVOXYMETOPON Poey.

Body naked, very long and thin, very gradually decreasing backwards till within a short distance of the extremity, when it more rapidly tapers into a

* I see none with barbed points, like those represented by Cuvier, in the specimen before me.

slender compressed caudal peduncle, on which is inserted a completely developed caudal fin. Anus submedian.

Lateral line simple, scarcely decurved from the scapular region, and continuous along the middle of the side to its end.

Head much compressed, oblong, with the profile regularly decurved from the nape or supraocular region to the snout, the occiput and forehead being trenchant and elevated. Eyes moderate or rather large, subcircular, and situated chiefly in the anterior half of the head. Operculum oblong, trapezoidal, not extending backwards as far as the pectoral fins, radiatedly striated on the surface, and giving a fringed margin to the bone above its angle. Nostril subcircular, in front of the eye.

Mouth moderate, the supramaxillars extending only to about the vertical of the front of the eye; intermaxillars and supramaxillars free, the latter highest towards the middle, where they are arched above, thence constricted and little widened towards the ends, with a terminal extension downwards abruptly truncated in front. Lower jaw deeply narrowed towards the symphysis, where it is moderately deep, and with the chin obtusely angulated.

Teeth—two or three strong, simple, compressed, recurved ones on each of the intermaxillars in front, and behind a row of small ones. Lower jaw with a row of nearly similar but straighter teeth. The palatines have a minute row, and, finally, the tongue is armed also with minute ones on the lateral margins.

Dorsal fin commencing nearly over the eye, slowly decreasing in a continuous line towards the caudal fin. Anal spines numerous, preceded by a dagger-shaped spine behind the anus; the spines mostly minute, free, posteriorly enlarged, connected by the membrane and forming a fin.

Caudal fin small, but normally developed, deeply forked and with subacute lobes.

Pectoral fins inserted almost horizontally, with the lowest rays longest and the border of the fins above them emarginated.

Ventral fins represented by short broad scales behind the pectoral region.

This genus is at once distinguished from *Lepidopus* by the form of the head, the origin of the dorsal fin, and the obtusely angular chin and the consequent ascent of the jaw forwards to the symphysis above. It is at present only certainly known as a West Indian type, but it is probable that a representative of it has wandered to the British shores, and been noticed under the name of *Trichiurus lepturus*.

EVOXYMETOPON TÆNIATUS Poey.

The greatest height equals about a twelfth of the extreme length, while the head forms about an eighth of the same. The head is oblong, trenchant above, elevated above the eyes for a space considerably greater than the diameter of the eye, and decurved very obliquely downwards to the snout. The diameter of the orbit enters about six times in the head's length. The first ten dorsal spines are undivided; the rest split.

B. 7. D. 87. A. 19. C. 17. P. 12.

The color is silvery, with about six narrow reddish bands most distinct behind, the first on the ridge of the back and the fifth along the lateral line.

One specimen, nearly five feet long, was procured by Prof. Poey, and has been kindly presented to the Smithsonian Institution. Is not this at least closely related to the fish found on the beach of the "Moray Frith, near the fishing village of Port Gordon," about three miles east from the mouth of the river Spey, "on the 12th of November, 1812," and noticed by Mr. James Hoy?* The specimen was referred by Hoy to the *Trichiurus lepturus*, but it

* For a notice of this fish, see the Transactions of the Linnean Society of Scotland, vol. xi. p. 210, and Yarrell's History of British Fishes, ed. 2, vol. i. p. 206.

evidently did not belong to that species, as the body gradually diminished for the latter half "to the tail, which ended in a blunt point;" the "dorsal fin extended from the head to the tail;" "both sides of the fish were white, with four *longitudinal bars of a darker color;* the one immediately below the dorsal fin was about two inches broad, each of the other three about three-fourths of an inch. The side line straight along the middle." "Its head had been broken off and quite gone."

In all the points thus enumerated, the Scotch fish decidedly differs from the species of the genus *Lepturus*, and it is equally distinguished from the *Lepidopus caudatus* by its bars of color, the latter, like *Lepturus*, having uniform silvery sides. It is true that Hoy denies ventral and anal fins, but it must be remembered that he was not a scientific ichthyologist; the ventral scales, as well as the anal fin, had also, perhaps, been lost, or, preoccupied with the idea that his fish was the *Lepturus*; Hoy did not carefully look for them. But whether this hypothesis is right or wrong, it is evident that Hoy had neither a *Lepturus* nor *Lepidopus* before him, and another large species of the sea remains to be confirmed by British naturalists as a visitant to their waters. The third edition of Yarrell's work is unknown to me, but its rediscovery can scarcely be signalized in it, since no mention is made of it in the subsequent work of Günther.

The following table indicates the relative proportions of the *Evoxymetopon tæniatus*.

Extreme length 100.

Body—Greatest height 8; Height at anus $6\frac{1}{4}$; height of tail between anus and caudal fin 5; least height of tail $\frac{1}{2}$.

Head—Greatest length 12; distance from snout to nape 7; length of snout $4\frac{1}{4}$; length of operculum $4\frac{1}{2}$; length of lower jaw 5.

Orbit—Diameter 2; distance from profile $2\frac{1}{2}$.

Dorsal—Height at first spine 3; height at second spine $3\frac{3}{4}$; height at ray above anus $1\frac{3}{4}$; height at ray between anus and caudal $1\frac{1}{4}$.

Caudal—Length of external rays $3\frac{1}{4}$.

Pectoral—Distance from snout at upper axilla 14; length $6\frac{1}{4}$.

Ventral—Distance from snout $17\frac{1}{2}$; length $2\frac{3}{4}$.

Synopsis of the North American GADOID FISHES.

BY THEODORE GILL.

In this paper I have corrected some errors that were copied in the "Catalogue of the Fishes of North America," and an endeavor has been made to distribute the species, approximately at least, among their natural groups and genera. The whole family yet requires a careful revision, and the chief points to be cleared are rather referred to and indicated than elucidated. May those who are more fortunately situated carefully elaborate the subject!

I. Caudal fin distinct. Lateral line continuous.

A. Anterior dorsal fin developed as a true and separate fin.

B. Ventral fins normally developed, with (3—) five to seven rays.

1. Posterior dorsal, as well as anal, sinuated or emarginated behind middle. Vertebræ with their neural spines developed, and wedged one into the other. Frontal bones double ..... MERLUCIINÆ.

* Teeth of inner row elongated, moveable ..... Merlucius.

2. Posterior dorsal and anal fins double. Vertebræ with moderate neural spines ..... GADINÆ.

a. Lower jaw longer. Barbel absent or rudimentary. .....

* Teeth of upper jaw of equal size ..... Pollachius.